

Solid State Pressure Sensor

PRELIMINARY
V0.4

Model 89

FEATURES

- ✓ Robust SS housing
- ✓ Compact Board Mount
- ✓ Oil-filled SS Isolated
- ✓ Custom Configurable
- ✓ Analog or Digital Output



DESCRIPTION

The Series 89 is a miniature and robust pressure transducer with calibrated and temperature compensated output. It incorporates MEMS sensing chip which is oil-filled and SS isolated. The sensor is configured with excellent media compatibility in its class of board-mount.

Multi-order compensation for correction of offset, sensitivity, thermal errors and nonlinearity are accomplished in factory via an internal DSP running a correction algorithm with calibration coefficients stored in on-chip EEPROM.

A variety of output configuration, including resolution, sampling rate, output interface are available to provide simple and ready-to-use solution for a wide range of application. Multiple chosen for pneumatic interface are suitable for system integration.

Multiple choice for gas or fluid interface are available upon request.

Specifications – Basic

Parameters	Min	Typ	Max	Unit
Temp - Operating ¹	-20		85	°C
Temp - Compensated ²	0		50	°C
Temp - Storage	-40		125	°C
Humidity ³	0		95	%RH
Over-pressure ^{4, 7}	3x			FS
Burst Pressure ^{4, 8}	6x			FS
Long-term Stability ⁵			1.0	%FS
Orientation Sensitivity ⁶			0.04	%FS/g
ESD – HBM	-4		+4	kV
Vibration	20g, 10Hz to 2Hz			

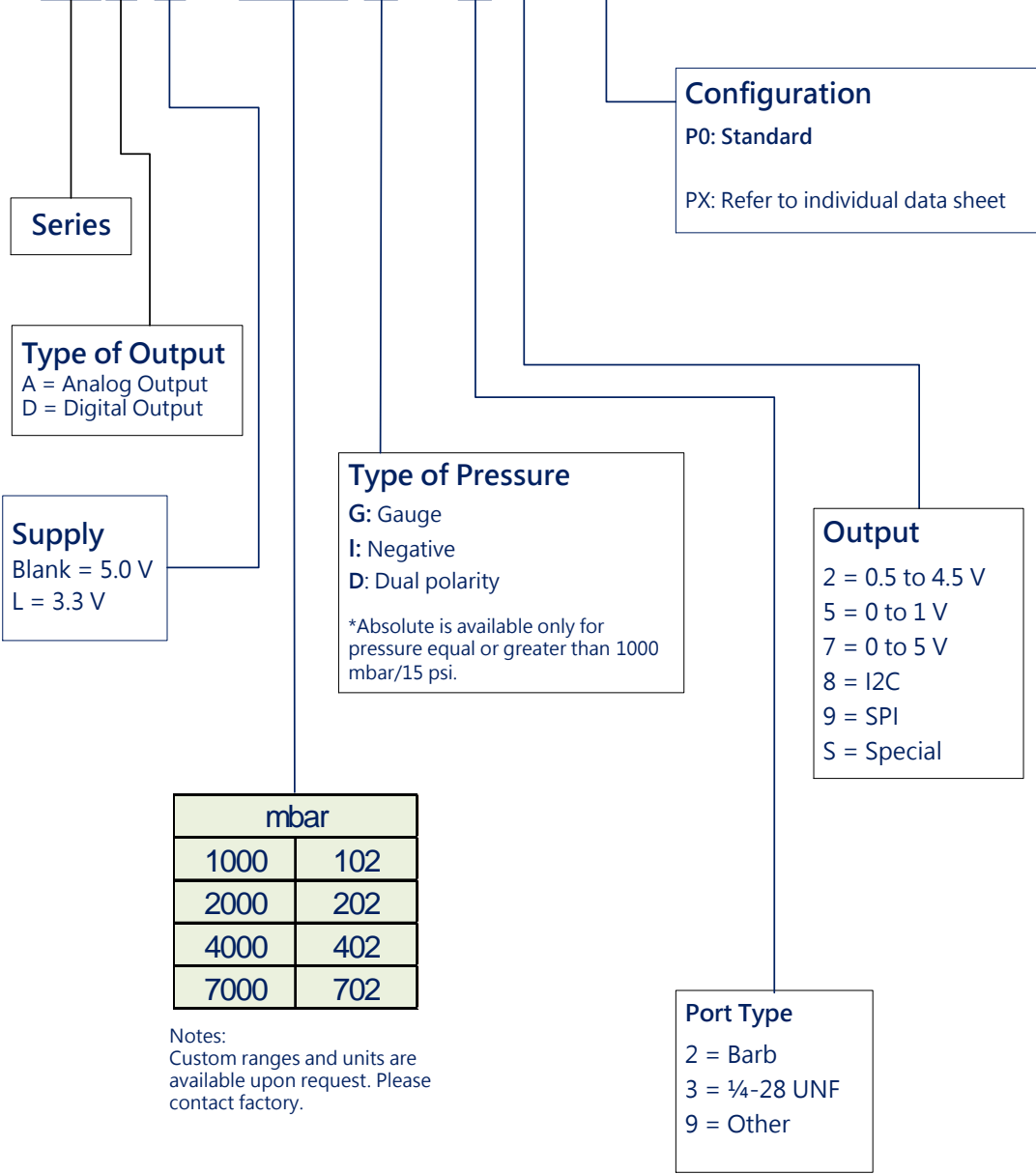
NOTES:

1. -40 to 85 °C is available upon request.
2. Custom temperature compensation is available upon request.
3. Gas only, no condensation.
4. Range dependent. Refer to individual data sheet.
5. Zero stability to be tested with 120 hour hot storage at 85 °C , which is roughly equivalent to accelerated aging of the part for over a year at Room Temperature.
6. Measured orientation effect on the zero output of 0.15 psi sensor with a standard deviation of 0.035% Full-Scale/g.
7. The maximum deviation in output from a Best Fit Straight Line (BFSL) fitted to the output measured over the pressure range at 25°C [77°F]. Includes all errors.
8. The maximum deviation from the ideal transfer function over the entire compensated temperature and pressure range. Includes all errors due to offset, span, NOL, hysteresis, non-repeatability, TCO, TCS and thermal hysteresis
9. Over-pressure (OP): the maximum pressure that may be applied to the sensor without causing a change in performance with respect to the specifications.
10. Burst-pressure (BP): The maximum pressure that may be applied to the sensor without a catastrophic failure.

Ordering Information

Series 89

89 D L - XXX G - 9 8 P 0



Notes:
Custom ranges and units are available upon request. Please contact factory.

Notes:
Custom interface is available upon request. Please contact factory.

Specifications – Analog Output

Parameters	Min	Typ	Max	Unit
Supply (V_{DD}) – 3.3V ¹	2.75	3.3	3.6	V
Supply (V_{DD}) – 5.0V ¹	4.75	5.0	5.25	V
Operating Current ²		2.2	3.2	mA
Resolution - DAC ³		13	16	bits
Output (-P) ⁴		10%		V_{DD}
Output (Zero) ⁴		50%		V_{DD}
Output (+P) ⁴		90%		V_{DD}
Accuracy ⁵		±1.5		%FS
Overall Error ⁶		± 2.5		%FS
Update Rate ⁷		1.2		kHz
Start-up Time ⁸			2.3	ms

NOTES:

1. 3.3V or 5.0V supply should be ordered separately. Other supply voltage from 2.75 to 5.5V is available upon request. With external JFET, supply voltage from 5 to 48V can be applied providing a special configuration should be ordered.
2. Continuously running measurement sequence is executed.
3. Higher resolution longer step response settling time. Dithering is available upon request and can be switched on or off.
4. V_{DD} -ratiometric voltage. For vented gauge pressure, zero is 10%. Absolute voltage output (0/1V, 0/5V) is also available upon request.
5. Combines errors at 25°C after reflow mounting and auto-zero. Pressure range dependent.
6. The maximum deviation in output from a Best Fit Straight Line (BFSL) fitted to the output measured over the pressure range and compensated temperature.. Combines errors of NOL, hysteresis, and repeatability. Pressure range dependent.
7. Single measurement duration in 16-bit with SSC on-chip temperature sensor. Resolution dependent.
8. V_{DD} ramps up to activate Digital data to ADC plus DAC settling time.
9. Recommended operating condition with external resistive load 1k Ω and capacitive load 10nF as low-pass filtering configuration at analog output for output bandwidth from 1kHz to 5kHz.

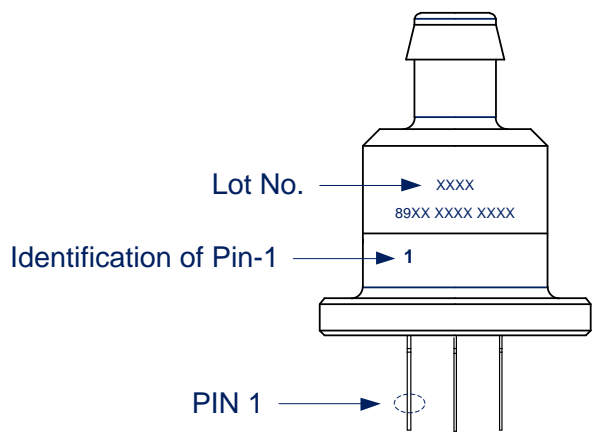
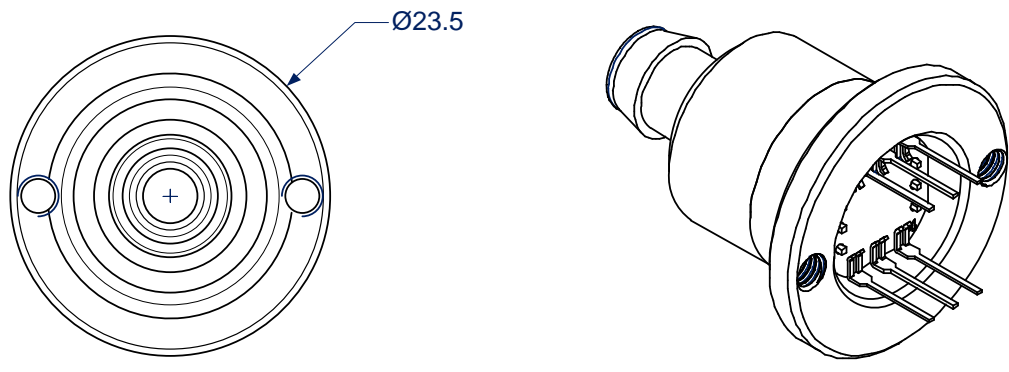
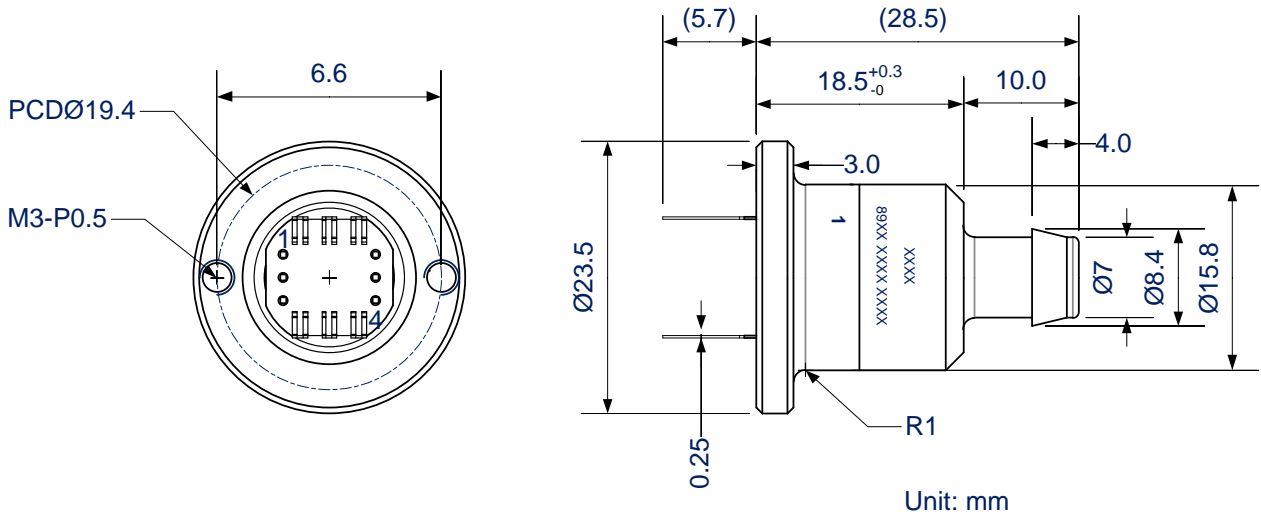
Specifications – Digital Output

Parameters	Min	Typ	Max	Unit
Supply (V _{DD}) – 3.3V ¹	2.75	3.3	3.6	V
Supply (V _{DD}) – 5.0V ¹	4.75	5.0	5.25	V
Operating Current ²		2.2	3.2	mA
Stand-by Current ³		0.8	1.5	uA
Resolution - ADC	12	16	24	bits
Output (-P) ⁴	6553 (dec) / 1999 (hex)			
Output (Zero) ⁴	32767 (dec) / 7FFF (hex)			
Output (+P) ⁴	58982 (dec) / E666 (hex)			
Accuracy ⁵		±1.5		%FS
Overall Error ⁶		± 2.5		%FS
Update Rate ⁷		1.2		kHz
Start-up Time ⁸			2	ms
Wake-up Time ⁹		2	10	us
Input High Level ¹⁰	0.7		1.0	V _{DD}
Input Low Level ¹⁰	0		0.3	V _{DD}
Interface Clock – I ² C	0.1		3.4	MHz
Interface Clock – SPI	0.05	1	12	MHz

NOTES:

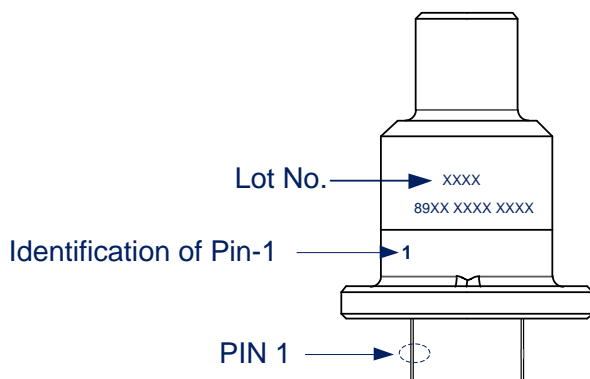
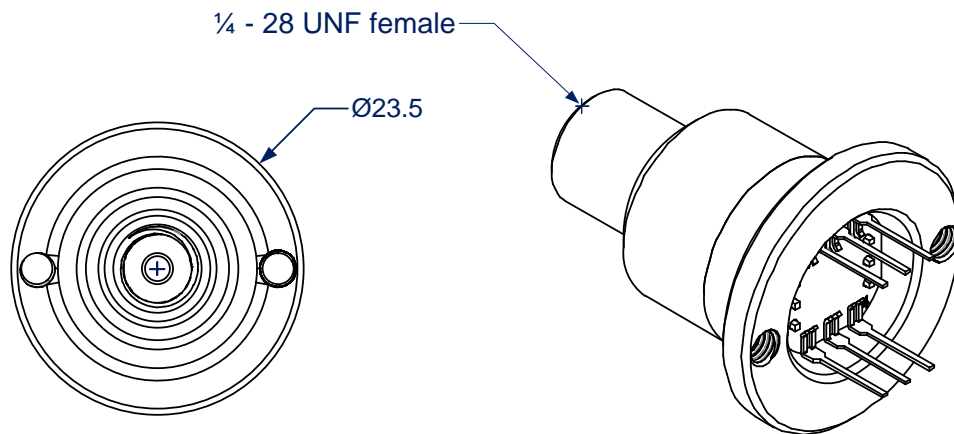
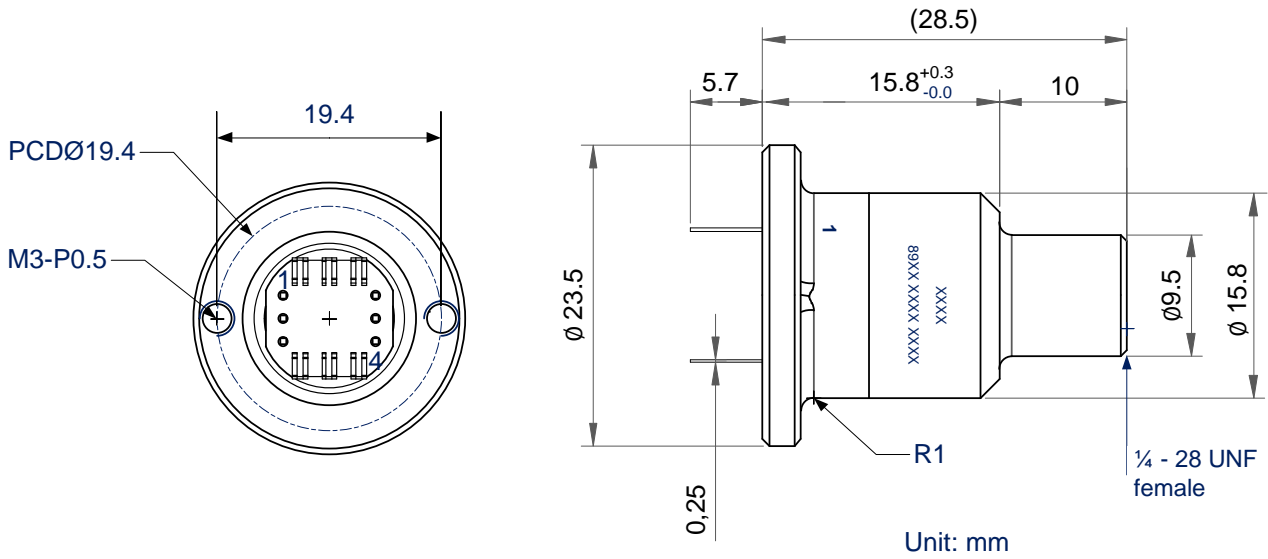
1. 3.3V or 5.0V supply should be ordered separately. Other supply voltage from 2.75 to 5.5V is available upon request. With external JFET, supply voltage from 5 to 48V can be applied providing a special configuration should be ordered.
2. 5V supply and analog output referenced. Current consumption are varied according to supply, response rate and resolution chosen. Normally sensing element is not always excited. Mean current consumption for one complete measurement cycle would be lower than the rated value.
3. Stand-by is for digital output only. Sensor automatically enters into Sleep mode after command execution for minimum current consumption, whereas the interface is still listening and accepts commands.
4. Unsigned integer. Resolution dependent and custom is applicable. For vented gauge, zero is 6553 (dec) 1999 (hex).
5. Combines errors at 25°C after reflow mounting and auto-zero. Pressure range dependent.
6. The maximum deviation in output from a Best Fit Straight Line (BFSL) fitted to the output measured over the pressure range and compensated temperature. Combines errors of NOL, hysteresis, and repeatability. Pressure range dependent.
7. Single measurement duration in 16-bit with SSC on-chip temperature sensor. Resolution dependent.
8. V_{DD} ramps up to activate Interface Communication.
9. Command mode or Sleep mode to active state of interface communication
10. Referenced to external supply voltage V_{DD}

Dimension - Barb fitting



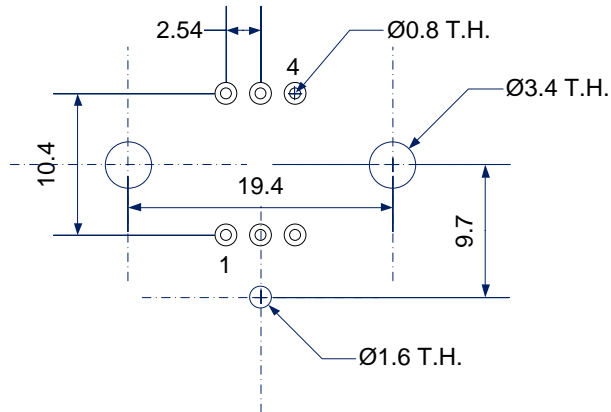
Marking Information

Dimension 1/4-28 UNF fitting



Marking Information

Foot Print



Pinout Assignment

Pad	Description
1	V _{DD}
2	V _{SS}
3	N.C.
4	SDA
5	SCL
6	N.C.

Table 1 - I²C

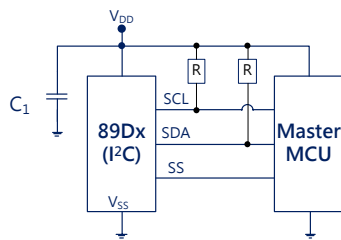
Pad	Description
1	V _{DD}
2	V _{SS}
3	SS
4	MISO
5	SCLK
6	MOSI

Table 2 - SPI

Pad	Description
1	V _{DD}
2	V _{SS}
3	SIG
4	N.C.
5	N.C.
6	N.C.

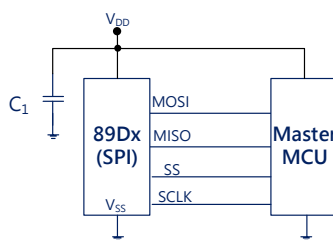
Table 2 - Analog

Application Circuit

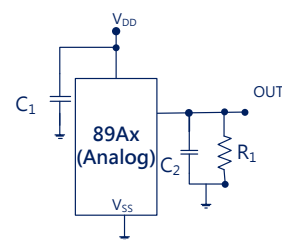


I²C

R = 10k
C₁ = 0.1μ



SPI



Analog

R₁ = 1k
C₂ = 10nF

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